(e) Obtain the gross weight of a tractor trailer or truck trailer in one weighing using vehicle scales.

(f) Obtain a correct tare weight of the unloaded vehicle by weighing the empty trailer with the same riders and truck accessories on the scale as when the gross weight was obtained.

(g) Do not use pre-determined tare weights for empty vehicles.

(h) Follow a consistent established policy of either weighing drivers and riders on or off the scales.

(i) Where the truck leaves the scale between the gross and tare weights, or the gross and tare weights are taken on different scales:

1) Check the zero balance every 30 minutes;

2) Notify the supervisor and scale official if the scale does not hold the zero balance for two consecutive checks; and

3) Continue to use the scale unless it malfunctions.

1.5 GRAIN FLOW SECURITY

Grain flow security is critical to the grain weight certification process. For official weighing of inbound grain, official personnel must ensure grain security from the unloading of the carrier to the completion of the weighing. For outbound grain movements, official personnel are responsible for correct weighing and for the secured movement of the grain from scale to carrier. A weight certificate attests to a known weight of grain in an identifiable carrier. The certificate must be accurate.

a. Detecting, Estimating, and Recording Grain Spills

(1) General Responsibilities

(a) When grain is spilled during shipping operations, collect and return sound grain to the grain flow, estimate and add a like amount of grain to the flow, or estimate and subtract from the weight credited to the carrier.

(b) Estimate grain spilled during unloading or left in inbound carriers, and record the estimated weight with a qualifying statement in the remarks section of the weight certificate.

(c) Round grain spill estimates to the applicable minimum scale division size.

(d) Follow certification procedures in Chapter 2 for spilled grain and grain left in carriers.

(e) Accurately determine the weight of a spill using one of the following methods which are listed in order of preference.

1) Weigh the grain if possible.

2) Use the Grain Spill Estimation Charts or grain spill formulas.

3) Analytically estimate spills, i.e., the grain filled ten 100 pound grain sacks or a portable hopper was filled half-full and the hopper's normal capacity was known.

4) Any method which requires action by the elevator before the estimate is made usually requires constant supervision to assure the delivery of the grain, and therefore it is less desirable.

(2) Specific Responsibilities

(a) Use Grain Spill Estimation Charts (listed in Appendix A) for an easy, time-efficient, and reliable method of calculating grain spills.

1) Use the actual test weight if the spill is from a lot of grain that has been officially inspected. Multiply the volume (bushels or hectoliters) by the test weight, pounds per bushel or kilograms per hectoliter. Use the trade weight if the spill has not been officially inspected. (See Section (c) for trade weights.)

2) To measure spills as accurately as possible, estimate irregular shapes by using an average of several measurements taken at different points to calculate a radius, width, or height. Determine the volume of the measurements and record the amount on the documentation.. Mentally or physically form irregular spills into a shape that fits one of the formulas.

Measure irregular spills with the Grain Spill Estimation Charts as follows:

3) Rectangles

   a) Locate the correct page by finding the proper height which is printed at the center top of the page.

   b) Locate the correct width; widths are printed across the top of the page.

   c) Locate the correct length; lengths are printed down the left side of the page. The volume figure is where the length figure and the width figure intersect.

   d) Multiply the volume figure by the appropriate test weight per bushel to determine the weight of the spill.

   e) Example: The following is an example of a spill that is rectangular with a height of 1.0 foot, a width of 9.0 feet, and a length of 5.0 feet.

RECTANGULAR GRAIN SPILL ESTIMATION CHART

Weighing Handbook
Appendix A
Chapter 1

DUAL POUNDS/KILOGRAMS
RECTANGLE GRAIN SPILL ESTIMATION CHART
METRIC UNITS SHADED

HEIGHT FEET (ft) = 1.0
HEIGHT METERS (m) = 0.3

** FIGURES SHOWN MUST BE MULTIPLIED BY TEST WEIGHT for lbs by lb/bu, for kgs by kg/hl

WIDTH	ft		0.5	1.0	1.5	2.0	2.5	3.0	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0
	m		0.2	0.3	0.5	0.6	0.8	0.9	1.2	1.4	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.7	2.9	3.0
LENGTH																					
	ft	0.5	0.2	0.4	0.6	0.8	1.0	1.2	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	3.2	3.4	3.6	3.8	4.0
	m	0.2	0.1	0.1	0.2	0.3	0.3	0.4	0.6	0.6	0.7	0.8	0.8	0.9	1.0	1.0	1.1	1.2	1.3	1.3	1.4
	ft	1.0	0.4	0.8	1.2	1.6	2.0	2.4	3.2	3.6	4.0	4.4	4.8	5.2	5.6	6.0	6.4	6.8	7.2	7.6	8.0
	m	0.3	0.1	0.3	0.4	0.5	0.7	0.8	1.1	1.3	1.4	1.5	1.7	1.8	2.0	2.1	2.2	2.4	2.5	2.7	2.8
	ft	1.5	0.6	1.2	1.8	2.4	3.0	3.6	4.8	5.4	6.0	6.6	7.2	7.8	8.4	9.0	9.6	10.2	10.8	11.4	12.0
	m	0.5	0.2	0.4	0.6	0.8	1.0	1.3	1.7	1.9	2.1	2.3	2.5	2.7	2.9	3.1	3.3	3.6	3.8	4.0	4.2
	ft	2.0	0.8	1.6	2.4	3.2	4.0	4.8	6.4	7.2	8.0	8.8	9.6	10.4	11.2	12.0	12.8	13.6	14.4	15.2	16.0
	m	0.6	0.3	0.6	0.8	1.1	1.4	1.7	2.2	2.5	2.8	3.1	3.3	3.6	3.9	4.2	4.5	4.7	5.0	5.3	5.6
	ft	2.5	1.0	2.0	3.0	4.0	5.0	6.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	19.0	20.0
	m	0.8	0.3	0.7	1.0	1.4	1.7	2.1	2.8	3.1	3.5	3.8	4.2	4.5	4.9	5.2	5.6	5.9	6.3	6.6	7.0
	ft	3.0	1.2	2.4	3.6	4.8	6.0	7.2	9.6	10.8	12.0	13.2	14.4	15.6	16.8	18.0	19.2	20.4	21.6	22.8	24.0
	m	0.9	0.4	0.8	1.3	1.7	2.1	2.5	3.3	3.8	4.2	4.6	5.0	5.4	5.9	6.3	6.7	7.1	7.5	7.9	8.4
	ft	3.5	1.4	2.8	4.2	5.6	7.0	8.4	11.2	12.6	14.0	15.4	16.8	18.2	19.6	21.0	22.4	23.8	25.2	26.6	28.0
	m	1.1	0.5	1.0	1.5	2.0	2.4	2.9	3.9	4.4	4.9	5.4	5.9	6.3	6.8	7.3	7.8	8.3	8.8	9.3	9.8
	ft	4.0	1.6	3.2	4.8	6.4	8.0	9.6	12.8	14.4	16.0	17.6	19.2	20.8	22.4	24.0	25.6	27.2	28.8	30.4	32.0
	m	1.2	0.6	1.1	1.7	2.2	2.8	3.3	4.5	5.0	5.6	6.1	6.7	7.2	7.8	8.4	8.9	9.5	10.0	10.6	11.1
	ft	4.5	1.8	3.6	5.4	7.2	9.0	10.8	14.4	16.2	18.0	19.8	21.6	23.4	25.2	27.0	28.8	30.6	32.4	34.2	36.0
	m	1.4	0.6	1.3	1.9	2.5	3.1	3.8	5.0	5.6	6.3	6.9	7.5	8.2	8.8	9.4	10.0	10.7	11.3	11.9	12.5
	ft	5.0	2.0	4.0	6.0	8.0	10.0	12.0	16.0	18.0	20.0	22.0	24.0	26.0	28.0	30.0	32.0	34.0	$\boxed{36.0}$	38.0	40.0
	m	1.5	0.7	1.4	2.1	2.8	3.5	4.2	5.6	6.3	7.0	7.7	8.4	9.1	9.8	10.5	11.1	11.8	12.5	13.2	13.9

The volume for the spill is 36.0 bushels. If the spill from an officially inspected lot of soybeans has a test weight per bushel of 58.0, then the correct weight of the spill would be 2,088 pounds.

$$36.0 \text{ bushels} \times 58.0 \frac{\text{pounds}}{\text{bushel}} = 2{,}088 \text{ pounds}$$

4) Cones

a) Locate the correct page by finding the height figure for your spill. Height figures are printed in ½ foot (0.1 meters) increments across the top of the page.

b) Locate the correct radius. Radii are printed down the left side of the page. Find the volume figure for the spill where the radius figure and the height figure intersect.

c) Multiply the volume figure by the appropriate test weight to find the weight of the spill.

5) Constant Running Spill

a) To locate the correct page, find the correct feed in bushels or metric tons per hour (separate charts). These figures are printed across the top of the page.

b) Determine the correct time in seconds that the spill was occurring. These figures are printed along the left side of the table. The volume figure for the spill is located where bushels per hour and the time intersect. The metric ton chart is read the same except the figure derived is kilograms. Because this is not a volume, the figure does not have to be multiplied by the test weight.

(b) Use mathematical formulas if it is impossible to weigh the spill or to use the Grain Spill Estimation Charts.

1) Measure spills using a tape measure or a similar device.

2) Mentally or physically form irregular spills into a shape that fits one of the formulas.

3) Estimate irregular shapes by taking an average of several measurements at different points to calculate a radius, width, or height.

4) Convert any measurements in inches or centimeters to tenths or hundredths of feet or meters for these formulas.

5) The 0.8 bushel per cubic foot and 10 hectoliter per cubic meter constant factors in these formulas converts the cubic feet measurement to bushels, and cubic meters to hectoliters respectively.

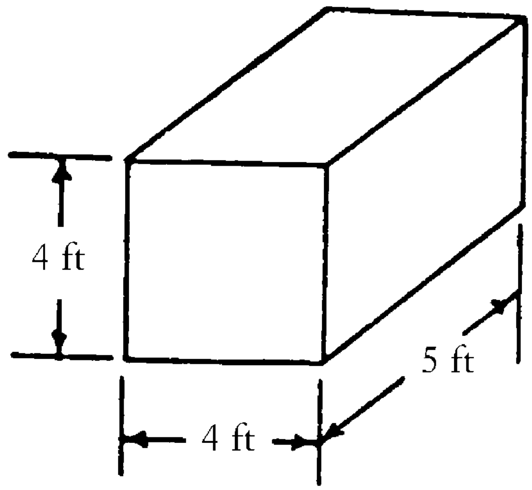
6) Multiply the bushels or hectoliters by the test weight of the grain to obtain the weight of the spill in pounds or kilograms.

7) Specific Formulas

a) Rectangular or Cube Formula

Length x Width x Height x 0.8 bu/ft^3 x Test Weight Per Bushel = Pounds

Example: Rectangular corn spill with dimensions as shown.

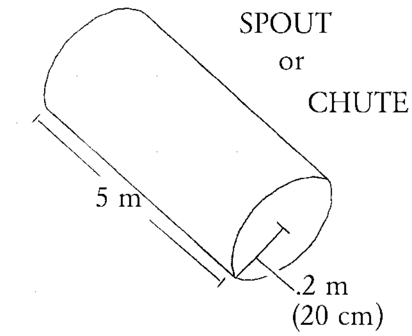


Answer: 5 ft x 4 ft x 4 ft x 0.8 bu/ft^3 x 56 lb/bu = 3,584 lb
Round final weight figure to 3,580 lb

b) Cylindrical Formula

(In metric units m = meters, hl = hectoliters)
B(3.14) x r^2 x Height x 10 hl/m^3 x Test Weight Per hl = Kilograms (kg)

Example: Cylindrical corn spill with dimensions as shown.

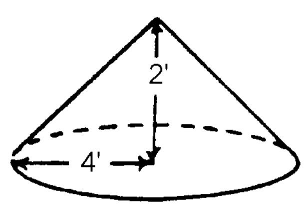


Answer: B x .2 m x .2 m x 5 m x 10 hl/m³ x 72.1 kg/hl = 4,528 kg.
Round final weight figure to 4,530 kilograms.

c) Cone Formula

$$\frac{B \times r^2 \times \text{Height}}{3} \times 0.8\ \text{bu/ft}^3 \times \text{Test Weight Per Bushel} = \text{Pounds}$$

Example: Conical soybean spill with dimensions as shown.



Answer: r^2 = (radius x radius). Radius = ½ diameter.

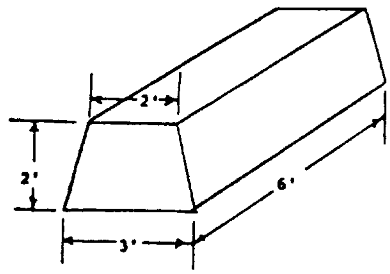
$$\frac{B \times 4\ \text{ft} \times 4\ \text{ft} \times 2\ \text{ft}}{3} \times 0.8\ \text{bu/ft}^3 \times 60\ \text{lb/bu} = 1607.7\ \text{lb}$$

Round final weight figure to 1,610 lb

d) Trapezoid Formula

$$\frac{\text{(Base + Top Width)}}{2} \times \text{Height} \times \text{Length} \times 0.8\ \text{bu/ft}^3 \times \text{Test Weight/bu} = \text{Pounds}$$

Example: Trapezoid wheat spill with dimensions as shown (Visualize as an inverted conveyor belt).



Answer: $$\frac{(3\ \text{ft} + 2\ \text{ft})}{2} \times 2\ \text{ft} \times 6\ \text{ft} \times 0.8\ \text{bu/ft}^3 \times 60\ \text{lb/bu} = 1{,}440\ \text{lb}$$

e) Constant Running Formula

Spills may occur over water from shipping belts or spouts. If a spill is observed from the time it begins until the time it ends, estimate the entire amount of the spill. If only a part of a spill is observed falling into the water, estimate the observed amount. Determine flow rates by estimating or calculating the feed on the shipping belts. Determine the amount of grain that the belt can run at 100 percent feed and calculate the percent at which the belts were running during the spill.

Flow Rate (Pounds/Hour) x Running Time (Fraction of an Hour) = Pounds

Example: Corn spilling into the water for 3 minutes.
Flow rate on belt estimated to 50,000 bushels per hour, (2,800,000 Pounds per hour).

Answer: 2,800,000 lb/hr x 0.05 hr = 140,000 pounds
(or)
2,800,000 lb/hr x 3 minutes x 1 hr/60 minutes = 140,000 pounds

(c) Use Trade Weight Table to determine the test weight when the grain spill occurred from a flow of grain that was not officially inspected.

Grain	Pounds/Bushels (Trade Weight)	Kilogram/Hectoliter (Trade Weight)
Corn	56	72
Sorghum	56	72
Flaxseed	56	72
Rye	56	72
Wheat	60	77
Soybeans	60	77
Oats	32	41
Barley	48	62
Triticale	48	62
Sunflower Seed	28	36
Canola	50	64
Mixed Grain	32	41
Corn Screenings	44	57

(d) Pertinent Conversion Factors

Cubic Meter Conversion Factor

1 cubic meter = 10 hectoliters

Cubic Foot Conversion Factor

1 cubic foot = 0.8 bushel

Conversion of Hectoliters of Grain to Kilograms

Hectoliters x Test Weight kg/hl = Kilograms

Conversion of Bushels of Grain to Pounds

Bushels x Test Weight Per Bushel = Pounds

Conversion of Pounds to Tons

$$\frac{\text{Total Pounds}}{\text{2,000 Pounds}} = \text{Short Tons}$$

$$\frac{\text{Total Pounds}}{\text{2,240 Pounds}} = \text{Long Tons}$$

Conversion of Pounds to Metric Units

Total Pounds x 0.45359237 = Kilograms

$$\frac{\text{Kilograms}}{1{,}000} = \text{Metric Tons}$$

2,204.623 pounds = 1 Metric Ton

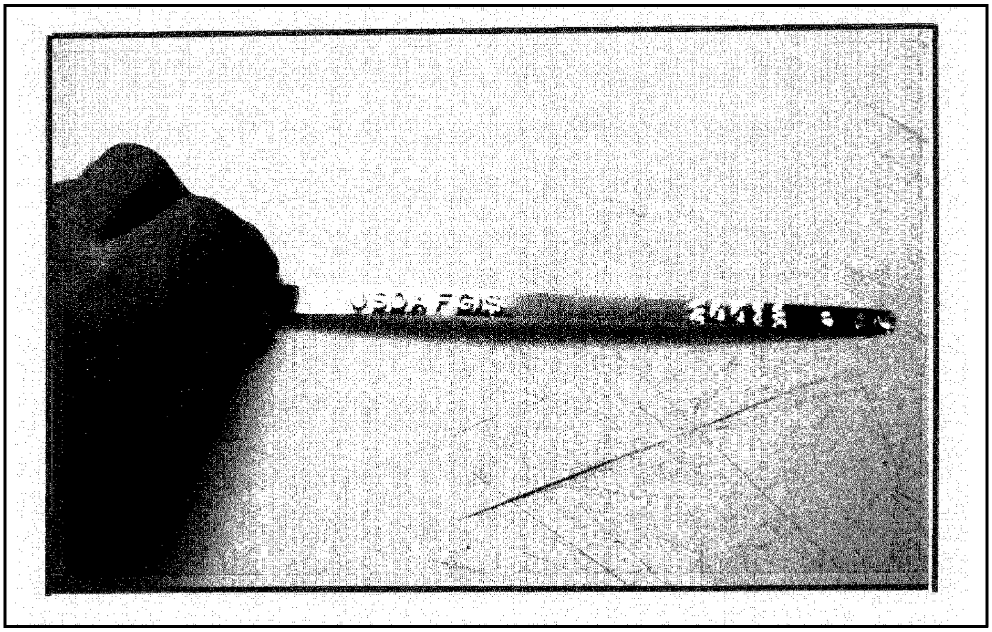
b. Diversion Points Controls to Ensure the Integrity of Grain Flow

(1) General Controls

Maintain security by using numbered railway strip seals, numbered padlocks, numbered cable seals, numbered wire seals, and electronic lockout (permissive) control devices. Multiple security devices may be required. Periodically check and record the number and placement of the seals and/or locks whenever any sealing system is used.

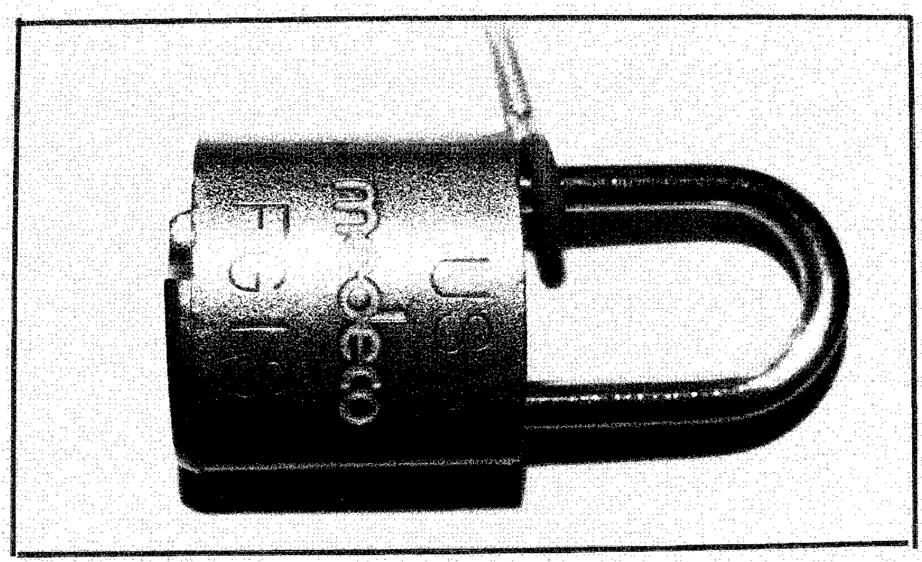
(2) Specific Controls

Railway Strip Seal



(a) Railway strip seals are sheet metal strips of approximately 6 to 8 inches in length that permanently lock when one end is inserted into the opposite end. They are impressed with numbers and/or letters which create an accountable record to prevent unauthorized breakage and unauthorized application of another seal. Although easily broken, the strip seal provides a means of securing grain flow. Prenumbered lead wire seals may be used in place of railway strip seals.

SECURITY PADLOCK



(b) Use padlocks in areas where greater physical security is needed, where security systems are frequently broken or tampered with, or when the reusability of security systems is advantageous. Permanently identify security padlocks with letters and numbers to create a unique identity for each padlock and record it in the Seal Log when a lock is either applied or removed.

1) Master keying systems can be established. One key opens a series of padlocks at a particular elevator and change keys open individual locks only. This system of keying provides security, flexibility, and ease.

2) Develop a system of key control to maintain the security of any padlock program.

(c) Use cable seals in areas where grain flow security is established on a permanent basis; they can only be removed by extreme force (e.g., hack saw, bolt cutters).

(d) Lockouts are incorporated in many control boards and can be used for maintaining grain flow security. Official personnel must:

1) Control the keys that operate the lockouts.

2) Verify and document biweekly to ensure that all indicating elements (lights) accurately depict the actual positions of diversion gates, turnheads, etc.

3) Verify export grain flow integrity on the Weight Loading Log every shift using an established facility checklist.

(e) Electronic lockout (permissive) control devices are provided at many facilities to monitor and ensure system security and grain flow integrity. In some facilities these lockouts are not electric panels and switches, but are programmable controllers or computers with visual displays. Lockout devices designate a switch or keyboard directly controlled by official personnel which, when activated, permit the movement of an elevator materials handling device, such as a gate or turnhead, from one position to another. Permissive devices ensure that grain flow patterns cannot be changed without official authorization. Check the lights or graphic depictions on these indicators biweekly.

(3) Unauthorized Seal or lock Breakage Procedures

When a seal or lock is found broken while grain is being officially weighed, the supervisor and the person having the most knowledge of the situation must find the cause of the problem.

(a) Answer the following questions:

1) When was the seal or lock last checked and found intact? Use the Seal Log to estimate the length of time that the seal or lock has been broken.

2) Can it be determined whether the breakage was accidental or deliberate, and did the grain flow remain secure during that time the seal or lock was broken?

3) Is this a constant problem at this grain elevator?

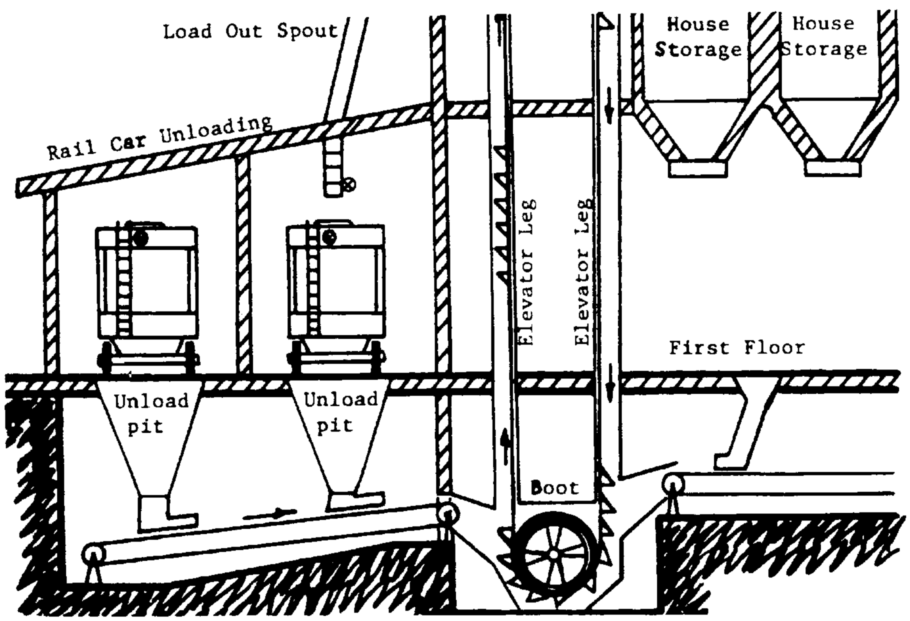
4) Can the amount of grain weighed during the time that the seal or lock was broken be certified on the weight certificate?

(b) Notify the FOM or AFOM.

(c) Correct the problem and ensure against future breakages.

(d) Make proper notations on the Seal Log and the Weight Loading Log.

RAILCAR UNLOADING AREA DIAGRAM



c. Inbound Grain Flow Operations

Grain is generally received by railcar, truck, or barge and weighed either on vehicle/truck scales, railway track scales, or is elevated to be weighed on hopper scales in the house.

(1) Inbound Carrier Unloading Area

(a) The railcar unloading area consists of unloading pits that receive grain from cars. Grain is usually moved by conveyor belts into the boot of an elevator leg which lifts the grain through the elevator and deposits it into a holding garner above the scale.

1) The railcar unloading pit is a rectangular shaped bin that funnels grain from railcars to conveyor belts located underneath the pit. Grain frequently overflows the unloading pit and spills out onto the track area. If uncontaminated, push this grain back into the pit upon completion of each railcar or unit train (however the lot is being certified). The pit itself must be completely free of grain when the lot is finished. Carefully monitor the area beside the conveyor belt for grain spills (especially the area below the unloading pit).

2) A railway track scale weighs the railcar prior to (gross weight) and after (tare weight) unloading. When obtaining the weight of grain from an inbound railcar on a railway track scale, the grain flow does not have to be monitored by official personnel.

(b) The truck unloading area consists of the truck dump pit and/or the truck platform scale. In many locations, the platform scale also functions as a hydraulic truck dumper.

1) The truck unloading pit is a small bin used to funnel grain to the conveyor belt or boot of an elevator leg.

a) The elevator leg lifts the grain through the elevator to deposit in a garner above a scale for weighing.

b) If the weight of the grain from a truck is obtained on a vehicle/truck scale: 1) grain flow does not have to be monitored; and 2) spills along basement conveyor belts need not be recorded (unless they pose a safety hazard).

c) If grain from the truck is weighed in the elevator on its house scales: 1) spills must be recorded; and 2) the unloading pit must be emptied between each lot.

2) A vehicle/truck scale is used to weigh the truck prior to (gross weight) and after (tare weight) unloading.

(c) The barge unloading area consists of a marine leg (or a similar unloading device) and a conveyor belt that transports grain into the elevator facility to a leg and then to a scale for weighing. In some areas, inclined belts are used to elevate the grain from the barge to the house scales.

1) A marine leg is similar to an elevator leg except smaller, movable, and positioned to remove grain from waterborne carriers.

a) The leg is lowered into a barge or vessel hold.

b) The marine leg's lower pulley is exposed to allow grain to be removed from the carrier.

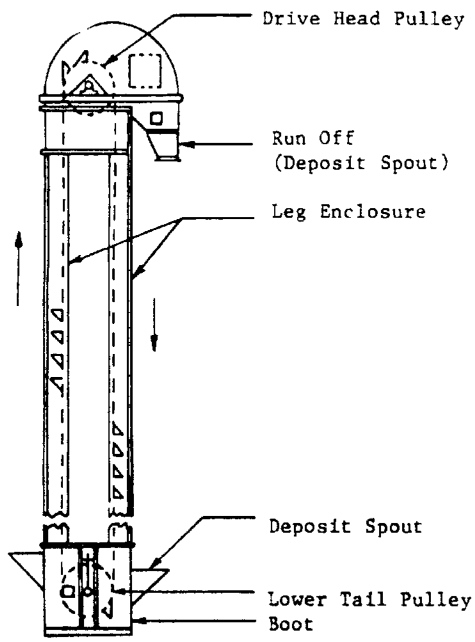
2) Monitor the entire route the grain travels from the barge unloading area to the scale(s) for spills, leaks, and diversion points.

(2) Movement of Inbound Grain Within the Elevator

(a) The basement contains conveyor belts that carry grain from storage bins, truck receiving pits, and car receiving pits to the boots of elevator legs.

(b) The boot encloses the tail pulley of an elevator leg. Grain is deposited into the boot by spouts or belts. The grain is picked up by the elevator leg to travel to the head floor. Many boots are surrounded by a pit area. This is a prime location for spilled grain because constantly moving grain can wear holes in the metal. Grain leaks out through the holes and accumulates in the boot pit or the area surrounding the leg.

ELEVATOR LEG



(c) An elevator leg raises grain by the use of buckets attached to a vertical belt which moves around a drive (head) pulley located at the top (head floor) and a pulley (tail) at the bottom. As the belt moves around the lower pulley, each bucket scoops up grain and carries it to the head floor where it is usually deposited into the upper garner. The elevator leg is completely enclosed by tin or steel plates.

Grain elevators may have several legs and official personnel must know the following:

1) The locations of all legs;

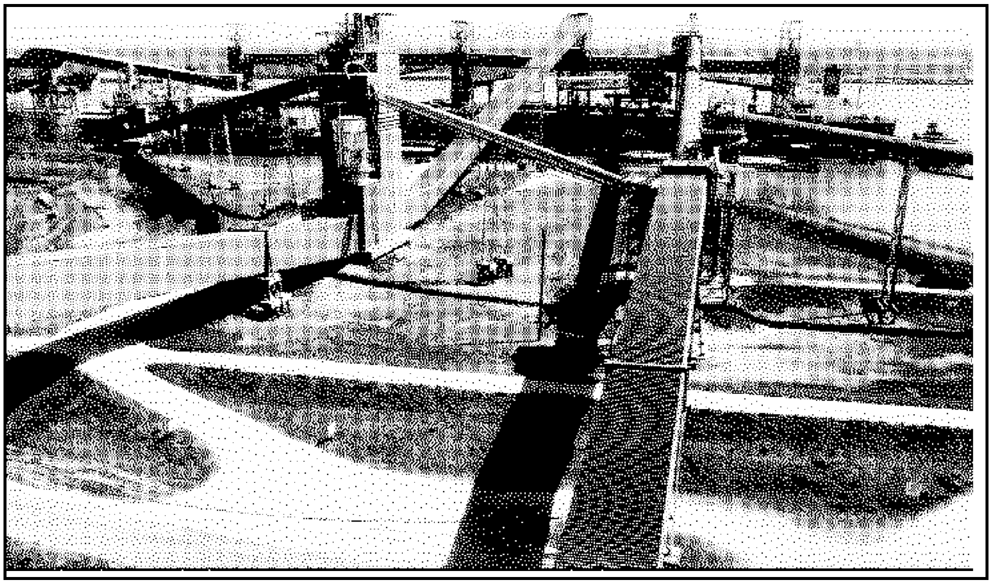
2) What belts or spouts supply them with grain; and

3) Where the legs can deliver the grain.

Moving grain can cause holes to wear in the leg encasement, resulting in leaks and spills on any floor in the facility. Emergency release doors exist in the run-off spouts of some legs to prevent "choking" the leg when the upper garner of a scale system overfills. This allows grain to escape the delivery system and, on inbound grain that has not been officially weighed, requires recording the grain as a spill.

Slipping drive belts and loose or separated buckets are safety hazards. Report them immediately to the supervisor.

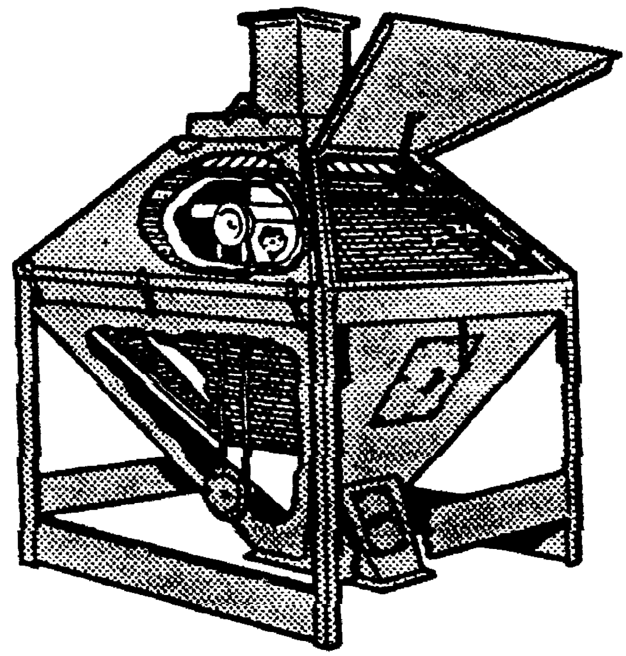
Incline Belts



Incline belts are used by some elevators to elevate the grain. Instead of elevator legs the grain is elevated on conveyor belts which are inclined at about 30-45 degrees. Some elevators use these belts to carry grain to and from the wharf, while others completely replace the elevator legs and exclusively use incline belts to elevate grain.

(d) The Head Floor is the top floor in the elevator; it houses the head pulleys of the elevator legs, the upper garner inspection doors, possible diversion points in the grain flow, grain cleaning devices, and sampling equipment. In some elevators, grain can be diverted immediately after elevation. Secure this area and monitor for inbound grain.

GRAIN CLEANING APPARATUS



(e) Grain cleaning apparatus separate large nongrain materials, such as pieces of wood, stones, cans, etc., from the grain or are used to separate screenings (dust or broken kernels) from whole grain. A cleaner can be located anywhere within the grain flow system. Inbound grain must not be cleaned before it is weighed.

(f) A Diverter-Type (D/T) Mechanical Sampling, an inspection device located in the path of grain flow, is used to obtain grain samples for determining grain quality and may be found in many locations throughout the elevator. Refer to the Mechanical Sampling Systems Handbook for specifics and requirements.

(g) Inspection doors of the upper garner allow access to the upper garner for cleaning or inspection and also allow the introduction into the upper garner of sweepings or materials other than grain to be officially weighed. The weight of this material affects the quality and the accuracy of the officially weighed lot and is prohibited. Sealing these doors is at the discretion of the manager.

(h) Located below the head floor, the scale floor houses the upper garner, weigh hopper, and bulk weighing equipment (mechanical, electronic, or both), and may contain lower garners and turnheads.

1) The upper garner is located above each weigh hopper to serve as a holding bin during the movement of grain prior to weighing. Upper garners are essential to the efficient operation of any grain weighing system; without them, the entire grain supply would have to be shut down during scale discharge.

2) The upper garner gate(s) regulates the flow of grain into the weigh hopper. The gates are controlled by electric motors, air pressure, hydraulically controlled cylinders, or manually operated levers.

3) The weigh hopper is a bin that is independently suspended from or supported by levers or load cells. The weigh hopper temporarily holds grain until a weight can be obtained. Weigh hopper access doors and observation ports must be closed securely to prevent the escape of grain resulting in spills. The weigh hopper lever system must be kept clean of grain and dust to ensure free movement of the lever system.

4) The weigh hopper gate(s) regulates the flow of grain out of the weigh hopper. Control mechanisms are similar to those used for the upper garner gates.

d. Outbound Grain Movement

Outbound grain movement begins immediately upon weighing. Once weighed, the identity of a lot of grain changes. For example, if grain from a unit train is weighed and then conveyed to an export vessel, after the grain has been weighed, the identity of the grain will be that of the vessel. Grain weighed and loaded into other carriers, regardless of its original source, is outbound grain.

(1) Scale Floor Description. (See the section preceding this one c. (h))

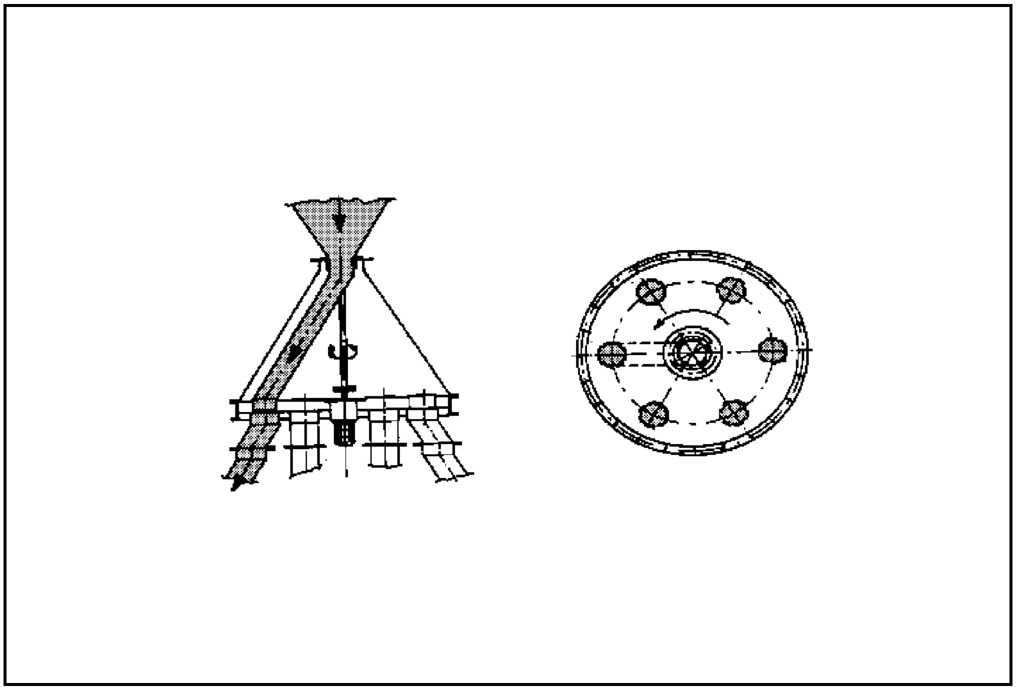
(2) Additionally, some elevators have a lower garner or surge bins which are located beneath the weigh hopper to regulate the flow of grain. While they are not as essential as upper garners and many elevators do not have them, they do allow for a quick and even scale discharge, and therefore, a more efficient weighing operation.

(3) Distributor Floor Description and Functions

Usually located below the scale floor, its main function is to give the elevator versatility in moving grain through the elevator to a loading or storage area. Many types of mechanisms are found here including turnheads, trolley spouts, tripper/belt combinations, and permanent or movable spouting.

Spills occur on the distributor floor during changes in grain flow direction and as a result of wear in spouts caused by moving grain. When spills occur, the intended destination of the grain must be known to correctly account for spills. The distributor floor, the most concentrated area of diversion points in the elevator, must be particularly well monitored to ensure correct weights.

DISTRIBUTOR



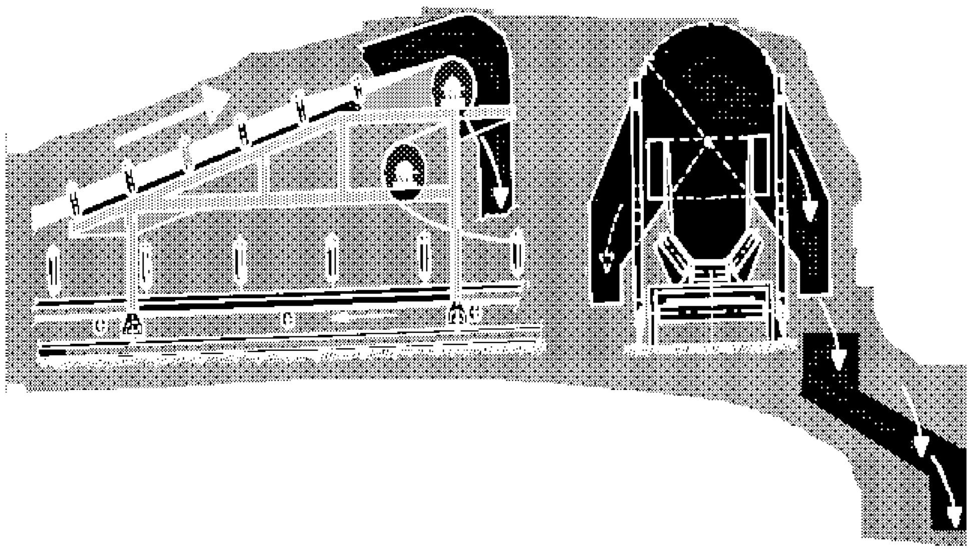
Distributors (rotary pictured) are movable spouts located outside or inside the elevator and positioned to revolve over permanent spouting. Distributors (turnheads) control distribution of grain to bins or to carriers.

(4) Bin Floor Description

The bin floor houses cleaner machines, screw conveyors, conveyor belts, and overhead access to shipping bins, house storage bins, screening bins, and spouts.

(a) Valves direct, limit, or seal off the flow of grain at any given point. Official personnel must know the different types (see glossary); their capabilities, and control (e.g., manual or hydraulic).

CONVEYOR BELT WITH TRIPPER



(b) A conveyor belt travels between two pulleys to carry grain.

(c) A tripper is a mechanical device for directing the flow of grain off of a conveyor belt into a spout or bin. More than one tripper on a conveyor belt is possible and most are movable. Some trippers can direct grain off either side of a conveyor belt; the weigher must ensure proper direction so that the grain flow is not misdirected.

(d) The shipping bin area houses shipping belts and bins. Spills at any point along this path must be recorded or else immediately returned to the flow of grain. Spills are found most often where the path of grain makes an abrupt change in direction (i.e., out of a spout and onto a conveyor belt, belt junctions, and trippers).

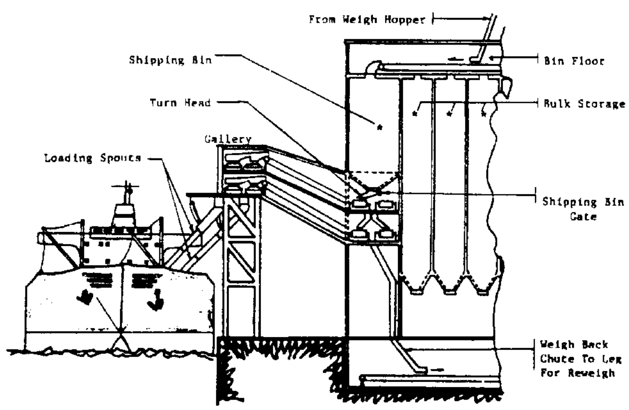
(e) Shipping bins are used to hold grain prior to carrier loading and add to the responsibilities of official personnel.

(f) Access openings to the bins for cleaning and inspection are located on the bin floor.

1) Sealing these openings is at the discretion of managers.

2) Use of shipping bins varies from elevator to elevator. 1) Facilities that sample grain before it is loaded into shipping bins often completely fill and empty the bins for each sublot. 2) Other facilities use shipping bins to control the flow of grain and for mixing purposes, and will continuously run grain into and out of them.

SHIPPING BIN AREA DIAGRAM

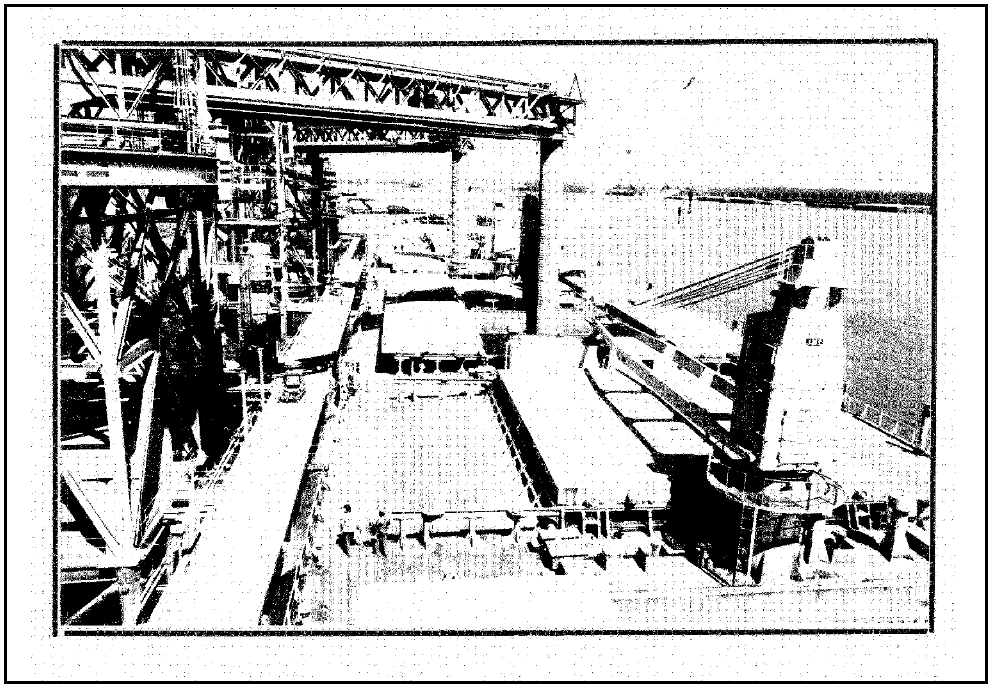


3) Shipping bin gates regulate the flow of grain from the shipping bins. Their use is restricted by the grain flow security system. Shipping bin gates must be secured in the absence of official personnel.

(g) Shipping belts carry grain to the loading spouts.

(h) Weighback spouts return grain from the shipping bins to be elevated and re-weighed, can be movable or permanently fixed, and must be secured when not in use.

SHIPLOADING AREA



(i) Waterborne carriers are loaded and unloaded in the shiploading area. The gallery, loading spouts, and marine legs are located here.

1) The gallery is an extension of the shipping bin area. Conveyor belts and/or chain drags located here direct grain to the loading spouts. This is another location where trippers are found on conveyor belts. Some elevators may have D/T mechanical samplers located in the gallery.

2) Loading spouts direct grain into the vessel's stowage area. Moving grain often wears holes in the metal loading spouts resulting in grain spill and leaks. Monitor the delivery system, report damage immediately, and account for all grain spills and leaks.

3) Monitor the vessel area and account for spills on the deck, on the dock, and into the water.